



Summary of Fishery Surveys Big Dardis Lake, Price County, 2016-2017

WDNR's Fisheries Management Team from Park Falls completed fyke netting and electrofishing surveys in 2016 and 2017 to assess the status of important fish populations in Big Dardis Lake. Annual fall electrofishing surveys began in 2014 to evaluate the contributions of natural recruitment and stocking to the walleye and muskellunge populations. Fyke netting in October yielded useful information on black crappies. Fyke nets deployed again shortly after the 2017 spring thaw targeted walleye, muskellunge, northern pike and yellow perch. A late-spring electrofishing survey documented the abundance and size structure of largemouth bass and bluegill populations. Quality, preferred, and memorable sizes referenced in this summary are based on standard proportions of world record lengths developed for each species by the American Fisheries Society. "Keeper size" is our own description applied to bluegill ≥ 7 inches and black crappie ≥ 9 inches long, based on known angler behavior.

Survey Effort

In our fall recruitment surveys we completed entire shoreline electrofishing circuits, sampling 2.58 miles in 1.12 hours on September 29, 2016 and 2.83 miles in 1.48 hours on September 21, 2017. We dipped gamefish of all sizes while giving priority to capturing juveniles. In fall 2016 water temperature (61°F) was just above the optimal range (50 – 60°F) for juvenile assessments. By contrast, water temperature averaged 72.5°F in our fall 2017 survey, remaining above the optimal range through September in regional surveys. On October 17, 2016 with water temperature ranging 55-58°F, we set four fyke nets for two nights (8 net-nights) to intercept fall movements of black crappies. On April 4, 2017 we set four fyke nets at locations chosen to intercept early-spring spawning species, fished them for seven nights (28 net-nights—a sevenfold increase over early spring 2009 netting effort), and checked them daily when water temperature was 43-52°F. Comparing measured water temperature with the optimal spawning temperature range of the targeted species, our spring fyke netting seemed well-timed to represent northern pike, walleye, muskellunge, and yellow perch population status. With water temperatures at 67°F our June 1st electrofishing survey should have coincided with the pre-spawning and spawning activities of largemouth bass and bluegills. We sampled the entire 3.16 miles of shoreline in 1.45 hours, including 0.50 miles sub-sampled for all species in 0.22 hour.

Background and Habitat Characteristics

Big Dardis Lake is a 144-acre drainage lake located about 5 miles east of Phillips, WI. The average depth is 11 feet, and maximum depth is 23 feet. The water is lightly stained by humic compounds from the watershed, but not turbid with algae and other suspended particles. Secchi depth was consistently 5.5 feet in four citizen measurements from August 24 to September 26, 2017. Secchi depth indicates Big Dardis Lake was eutrophic. However, since water clarity was not predominately influenced by algae, chlorophyll measurements would be necessary to determine the lake's true level of nutrient enrichment. The substrate is 60% sand, 25% muck, 10% rock, and 5% gravel, supporting a moderate

density of submergent and emergent vegetation. An unnamed stream discharges about 0.5 cubic feet per second from the northeast corner to Hoffman Creek, a tributary to the Elk River. The surrounding shoreland is 16% bog, and the rest is mixed hardwoods and pine. Curly-leaf pondweed and Chinese mystery snails are invasive species verified as present in Big Dardis Lake. Worcester Township maintains a public boat landing near the outlet. A town ordinance limits motorboat speed to 30 miles per hour and allows waterskiing only from 9:00 a.m. to 3:00 p.m.

Summary of Results

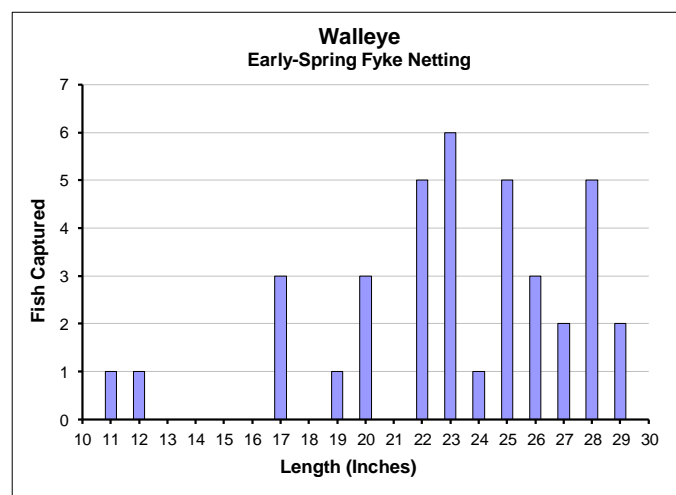
Like in our last surveys, largemouth bass was again the dominant predator, and bluegills were the most common panfish. We documented 13 fish species in our fall and spring surveys, compared to 15 species captured in 2008-2009 and 2014-2015 combined. A variety of forage was present, including golden shiners, creek chubs, and white suckers.

Walleye



Early Spring Fyke Nets

Captured	2.0 per net-night	$\geq 10"$
Quality Size	$\geq 15"$	95%
Preferred Size	$\geq 20"$	84%
Memorable Size	$\geq 25"$	45%



Using the non-standard Schnabel method and pooling the catch from lifts 2-4, we estimated that walleye population density was 0.4 adults per acre ($n = 55$; $CI_{95\%} = 34-88$; $SD = 13.2$; $CV = 0.24$), based on the ratio of fin-clipped to newly-captured fish in seven successive fyke net lifts. The gender of all walleyes in our sample was apparent—11 marked females and 18 marked males were at large before the final netting visit. Walleye density of about one adult per acre is typical of populations in the ceded territory maintained primarily by stocking. At low density, adult walleye populations usually have higher-than-average shares of preferred- and memorable-size fish, as we found in our early spring 2017 fyke nets.

Stocking is the main source of new recruits to the adult population. Big Dardis Lake received walleyes stocked at rates of 50 small fingerlings per acre in 1999 and 2001, 35 small fingerlings per acre in 2007, 2009, 2011, and 2013, and 20 large fingerlings per acre in 2014 and 2016. Fall electrofishing in 2014, 2016, and 2017 produced no evidence of natural recruitment. Our fall 2015 survey showed unconfirmed signs of natural year class production—annular counts on scales verified that six walleyes 7.0-7.8 inches were yearlings, but we did not take scales from the six walleyes 6.2-7.0 inches that we presumed were natural fingerlings produced in spring 2015. In our late spring 2017 electrofishing survey we incidentally captured 263 walleyes 6.2 – 9.9 inches long. In a sample of those young walleyes ($n = 31$; average = 7.5"; range 6.5-8.9") whose ear bones we extracted, magnified, and examined under blue-violet light, all fish had the fluorescent mark they received as fry to identify their hatchery origin. The chemical mark was absorbed and permanently retained in bony tissue when the 3-day-old fry were

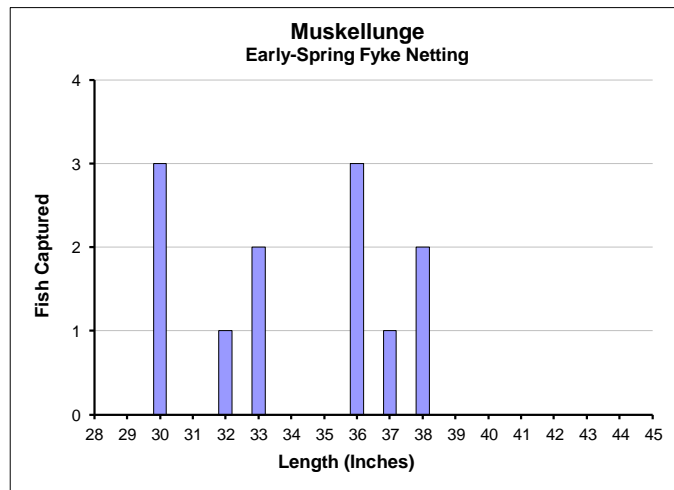
immersed for 6 hours in a 378 ppm solution of the antibiotic, oxytetracycline. All fish stocked in the Wisconsin Walleye Initiative carry the oxytetracycline mark. Despite the promising signs of overwinter survival that we noted in our late spring survey, our low electrofishing catch rates of 2.2 and 2.5 yearlings per mile in fall 2015 and 2017 suggest that few stocked fingerlings survived through their first growing season at large. Unless stocked fingerlings are contributing to the population without being detected as yearlings in fall surveys of non-stocked years, then the current walleye stocking strategy for Big Dardis Lake should be modified or discontinued. The next scheduled assessment of adult walleye density is scheduled in 2025.

Muskellunge



Early Spring Fyke Nets

Captured 0.4 per net-night $\geq 20"$	
Quality Size $\geq 30"$	100%
Preferred Size $\geq 38"$	17%
Memorable Size $\geq 42"$	0%



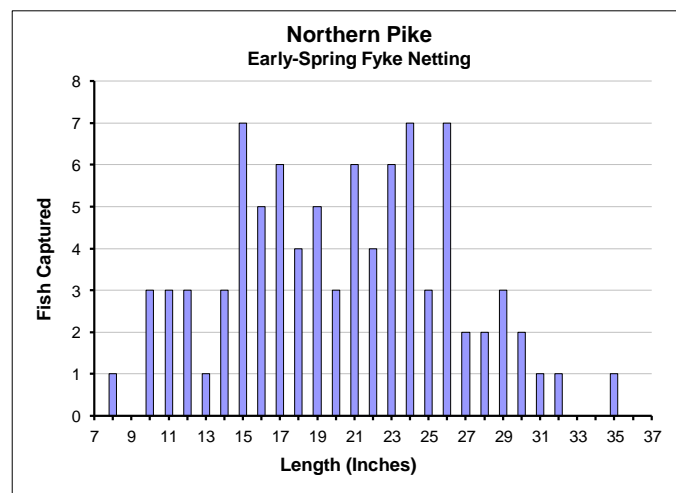
Our capture rate of muskellunge in early spring fyke nets points toward low to moderate abundance comparable to populations sustained primarily by stocking. Big Dardis Lake has received muskies stocked usually at a rate of 0.5 large fingerlings per acre in odd-numbered years since 2001. Before then, musky fingerlings were stocked at higher rates (usually 1 or 2 and once 4 per acre) in nine years 1972–1998. Though not represented in early spring 2017 fyke nets, low population abundance allows at least some muskies to attain memorable size ≥ 42 inches long. Fall electrofishing incidentally captured five muskies 42–47.3 inches long in 2014 – 2017. Of 27 muskies now marked with passive integrated transponder (PIT) tags, we recaptured two by electrofishing in spring and fall 2017 at 40.7 and 43.5 inches long, respectively. Those fish, whose gender we could not determine, gained 1.8 and 0.1 inches total length in the 620 and 357 days after we tagged them. Even young muskellunge appear to be growing slowly in Big Dardis Lake. In our fall 2017 sample, the average length of five muskies 15.7 – 19.5 inches long increased only 5.5 inches in two years since the 2015 batch was stocked at an average length of 12¼ inches. No tags, fin clips, or age estimates are available to verify their 2015 hatchery origin, however. Maintenance stocking provides angling opportunity for muskellunge that probably would not otherwise exist in Big Dardis Lake, though continued stocking at a reduced rate or frequency may deliver a similar fishing experience.

Northern Pike



Early Spring Fyke Nets

Captured	3.4 per net-night $\geq 14"$
Quality Size $\geq 21"$	58%
Preferred Size $\geq 28"$	13%
Memorable Size $\geq 34"$	1%



Using the ratio of fin-clipped to newly-captured fish in seven successive fyke net lifts, we estimated that northern pike population density was 1.5 adults per acre ($n = 219$; $CI_{95\%} = 142-339$; $SD = 49.0$; $CV = 0.22$). Of the 79 fin-clipped northern pike at large at the start of our last netting visit, 27 were female, 48 were male, and four pike $\geq 12"$ had unknown gender. In moderately low density the northern pike population produces higher proportions of preferred-size fish compared to those in many nearby waters. Big Dardis Lake anglers have better-than-average odds of catching pike 30 inches or longer. Northern pike recruitment relies solely on natural reproduction, though year class production is poorly characterized in fall electrofishing surveys, our traditional method to assess recruitment in several gamefish populations.

Yellow Perch



Early Spring Fyke Nets

Captured	1.0 per net-night $\geq 5"$
Quality Size $\geq 8"$	0%
Preferred Size $\geq 10"$	0%
Memorable Size $\geq 12"$	0%

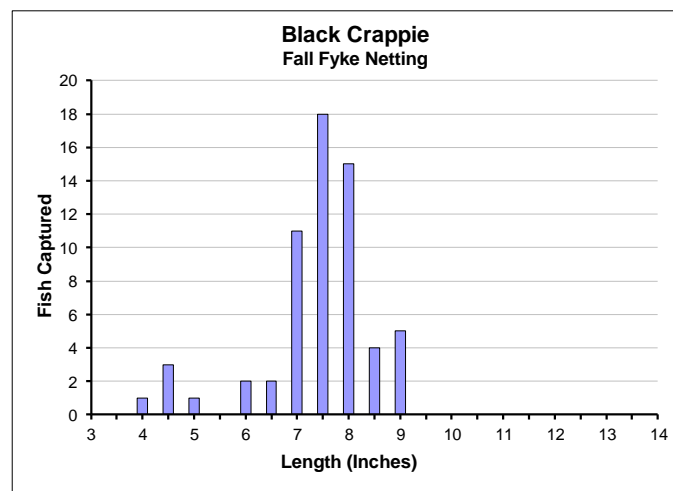
Comparing fyke net capture rates at similar water temperatures in early spring 2009 (49°F) and 2017 (43-52°F), our measure of yellow perch abundance decreased from 120 to 1.0 perch $\geq 5"$ per net-night. Population size structure was rated as very poor with no quality-size perch 8 inches or longer captured in any of our 2008-2009 and 2016-2017 netting and electrofishing surveys. Small perch offer no angling opportunity, but they are preferred food of largemouth bass, muskellunge, and walleye. We do not know if the apparent decrease in perch abundance has any causal connection to the biennial influx of walleyes stocked at 20 large fingerlings per acre, which began between our two most recent fishery assessments.

Black Crappie



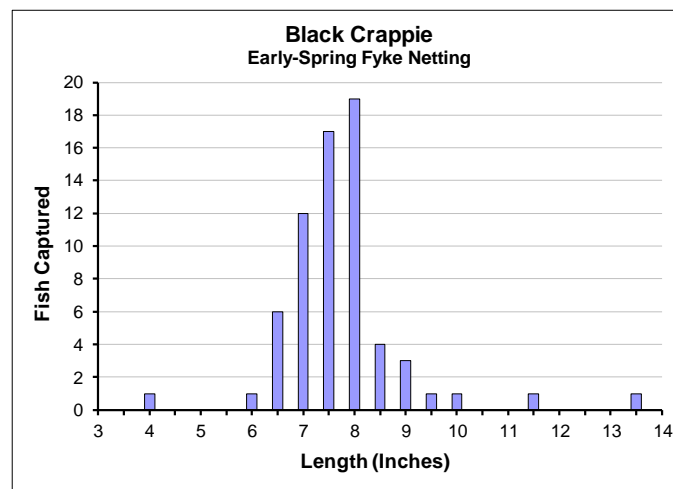
Fall Fyke Nets

Captured	7.3 per net-night $\geq 5"$
Quality Size $\geq 8"$	41%
Keeper Size $\geq 9"$	9%
Preferred Size $\geq 10"$	0%
Memorable Size $\geq 12"$	0%



Early Spring Fyke Nets

Captured	6.2 per net-night $\geq 5"$
Quality Size $\geq 8"$	45%
Keeper Size $\geq 9"$	11%
Preferred Size $\geq 10"$	5%
Memorable Size $\geq 12"$	2%



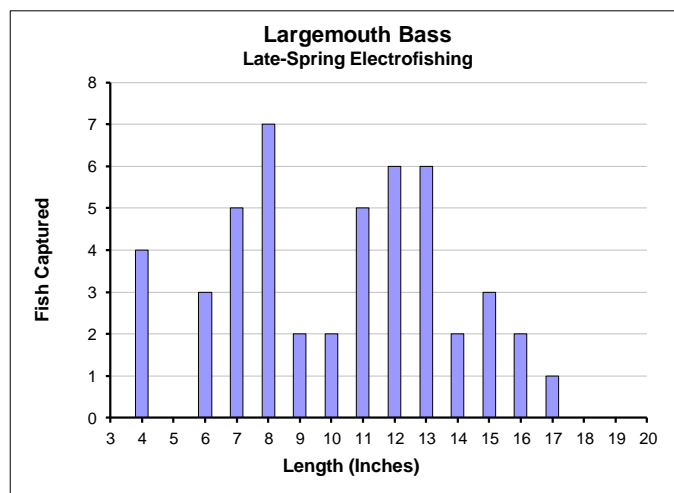
Except for a handful of preferred-size crappies that were absent in fall fyke nets, both recent netting surveys portrayed a black crappie population in moderate abundance with low proportions of keeper-size fish 9 inches or longer. Despite no obvious signs of crowding and food competition, crappies grow slowly in Big Dardis Lake. From our spring 2017 electrofishing survey we sacrificed 10 male crappies and two of unknown gender in a pooled sample 8.1-8.9 inches long, extracted and cross-sectioned their ear bones, and counted calcified rings to estimate their age. On average crappies grew to 8.4 inches in 7 or 8 years ($n = 9, 2$; $SD = 0.29, 0.21$), and one male crappie needed 11 years to reach 8.5 inches long. Average length at ages 7 and 8 were 2.3 and 3.0 inches below the regional average lengths at those ages and close to those derived from scales collected in fall 2008 (mean = 8.7, 8.8; $n = 3, 3$; $SD = 0.47, 0.12$). If stocking large walleye fingerlings were to eventually increase predation on young crappies, perhaps crappie growth rates could improve and allow the population to produce more keeper- and preferred-size fish that anglers like to eat.

Largemouth Bass



Late Spring Electrofishing

Captured 11 per mile or 25 per hour $\geq 8"$	
Quality Size $\geq 12"$	56%
Legal Size $\geq 14"$	22%
Preferred Size $\geq 15"$	17%



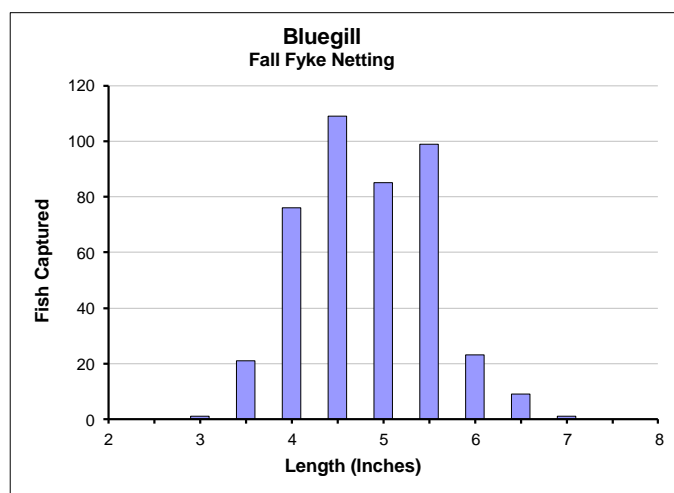
Our electrofishing capture rates in late spring 2017 represented a largemouth bass population in low to moderate abundance. Electrofishing catch rates decreased from those recorded on May 20, 2009 when water temperature was 61°F and we captured 19 bass $\geq 8"$ per mile or 33 per hour. Coincidentally, the proportions of quality-, legal-, and preferred-size bass increased from 24%, 5%, and 2% in our late spring 2009 electrofishing survey. Anglers can expect less bass fishing action with a greater chance of catching bass 14 inches or longer, compared to the population status we documented in 2009.

Bluegill



Fall Fyke Nets

Captured 53 per net-night $\geq 3"$	
Quality Size $\geq 6"$	8%
Keeper Size $\geq 7"$	0.2%
Preferred Size $\geq 8"$	0%



Our 2016-2017 netting and electrofishing surveys depicted a bluegill population in high abundance with very low proportions of keeper-size fish. Electrofishing capture rates doubled from 123 bluegills $\geq 3"$ per mile or 214 per hour in late spring 2009, but the share of keeper-size bluegills remained unchanged at 0-2% in all samples from both periods. Undoubtedly, the population's size structure would be unappealing to most anglers who want to keep a bluegill meal. With high abundance and poor size structure we presume that bluegills still grow as slowly as they did in 2009 when scale analysis revealed that bluegills in Big Dardis Lake were 0.6 and 0.8 inches below the regional average lengths (6.4 and 6.9") at ages 5 and 6. The prospects for improvement in bluegill size distribution seem bleak without more predatory pressure to control bluegill recruitment. Walleyes now intensively stocked as large

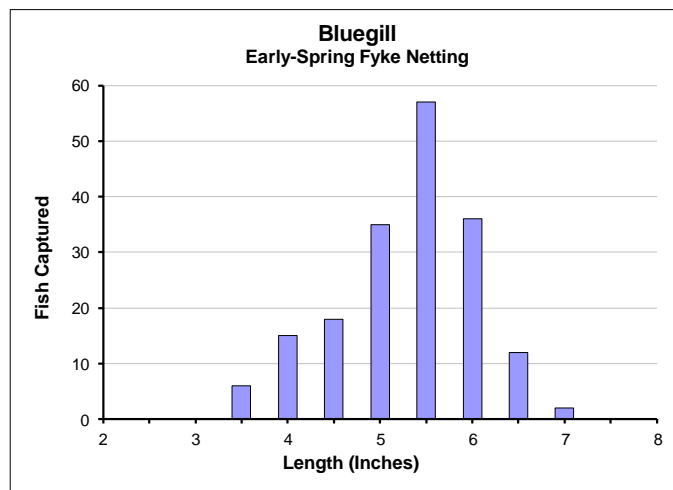
fingerlings may provide that necessary restraint on bluegill abundance to grow bluegills faster so more can reach 7 or possibly 8 inches before they die of natural causes. However, initial indications suggest that few stocked walleyes survive through their first growing season at large, so we are not optimistic that bluegill fishing will get better soon.

Bluegill



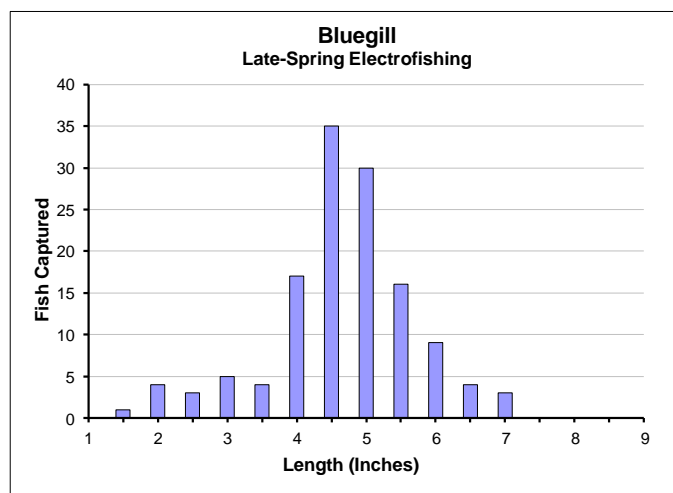
Early Spring Fyke Nets

Captured 21 per net-night ≥ 3 "	
Quality Size ≥ 6 "	28%
Keeper Size ≥ 7 "	1%
Preferred Size ≥ 8 "	0%



Late Spring Electrofishing

Captured 246 per mile or 559 per hour ≥ 3 "	
Quality Size ≥ 6 "	13%
Keeper Size ≥ 7 "	2%
Preferred Size ≥ 8 "	0%



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Reviewed and approved for web posting by: Mike Vogelsang—Northern Administrative District Supervisor, July 15, 2019.

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